

REMARKS

Claims 1-10 are currently under examination. The examiner has withdrawn claims 11-23 as being directed to non-elected subject matter. Claim 1 has been amended to recite that the induction portion of the gas sensor is coated with a silicon dioxide laminar. Support for the amended is found in the specification on page 9, lines 19-21 and also on page 17, lines 12-18. Claim 6 has been amended merely for purposes of clarification and not to limit its scope. Claim 10 has been amended without prejudice or disclaimer to correct a typographical error. The phrase “the polymer-type fuel cell”, which did not have antecedent basis, has been changed to “a polymer-type fuel cell”. No new matter has been added into the claims.

Response to Claim Objections

Claims 6-9 were objected to for reciting method steps in apparatus claims. In view of the amendments made to claim 1 (from which claims 6-9 depend) and the clarifications made to claim 6, the procedures provided in claims 6-9 are understood to define the claimed product, *i.e.*, claims 6-9 are proper “product-by-process” claims. MPEP 2113. Accordingly, the rejection has been overcome and should be withdrawn.

Claim 10 was objected to for not providing antecedent basis for the phrase, “the polymer-type fuel cell”. The phrase has been amended without prejudice or disclaimer to read, “a polymer type fuel cell”, thereby obviating the rejection. Thus, the objection is no longer applicable and should be withdrawn.

Response to Rejection Under to 35 U.S.C. § 102(b)

Claims 1-2, and 4-9 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Castillo *et al.*, U.S. Patent No. 6,019,946. The reference is not anticipatory because it does not provide a silicon dioxide laminar coating generated by an aging process on the surface of an induction portion of a gas detecting element. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir.

1987); MPEP 2131. In view of the amendment to claim 1, which indicates that the induction portion of the gas sensor is coated with a silicon dioxide laminar generated by an aging process, the rejection has been obviated and should be withdrawn. Furthermore, Castillo *et al.* does not render the claims obvious for the same reasons it does not render claims 3 and 10 obvious as explained below.

Response to Rejections Under 35 U.S.C. § 103(a)

Claim 3 has been rejected under 35 U.S.C. § 103(a) as being obvious over Castillo *et al.*, in view of Mosely & Tofield, SOLID STATE GAS SENSORS, p. 20 (IOP Publishing Ltd., 1987) and claim 10 has been rejected under 35 U.S.C. § 103(a) as being obvious over Castillo *et al.* in view of Murphy *et al.*, U.S. Patent No. 5,964,089.

The Supreme Court set forth the following factual inquiries for consideration in an obviousness analysis: (1) the scope and contents of the prior art; (2) the differences between the prior art and the claims in issue; (3) the level of skill in the pertinent art; and (4) objective evidence and secondary considerations. *KSR International Co. v. Teleflex, Inc.*, 127 S.Ct. 1727 (2007) *citing Graham v. John Deere Co.*, 383 U.S. 1 (1966). In accordance with the Supreme Court's guidance, the claimed subject matter in the instant case is not obvious based on:

- A. The differences between the prior art and the claims in issue; and
- B. Objective evidence and secondary considerations.

The references cited in the rejection differ from the claimed subject matter by failing to describe a gas detecting element having an induction portion coated with a silicon dioxide laminar generated by an aging process. To establish *prima facie* obviousness, all the elements of the claims must be found in the prior art. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991); *In re Royka*, 490 F.2d 981 (CCPA 1974). In the instant case, the references applied against the claims do not describe or suggest an induction portion of a gas sensor coated with silicon dioxide as recited by the instant claims. The specification explains that silicon vapor is used in an aging process to "react with the oxidation catalyst of the induction portion 5 to become silicon dioxide

that adheres to the surface of the induction portion 5.” *See, e.g.*, p. 9, lines 19-21. Thus, the claims in issue differ from the references by including an outer laminar of silicon dioxide generated by an aging process, and since every element of the claims is not accounted for, a *prima facie* case of obviousness does not exist.

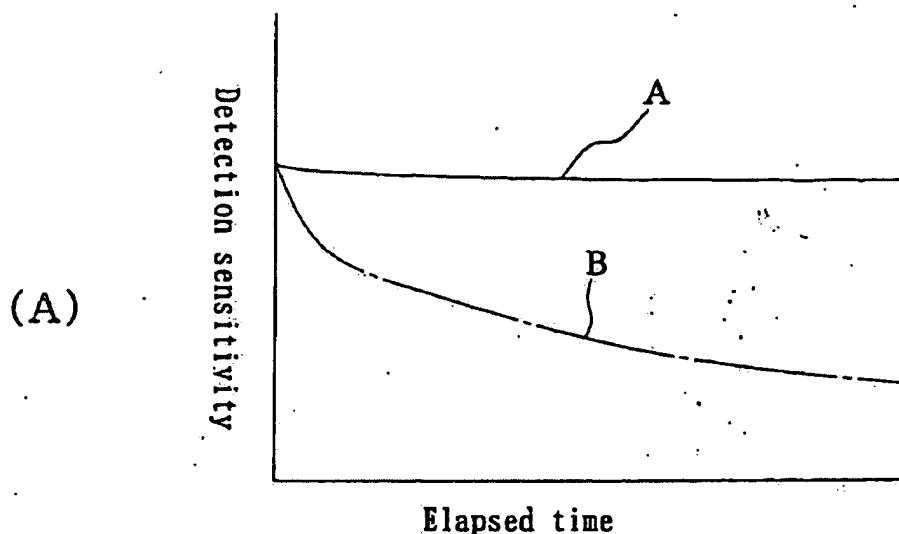
With respect to objective evidence and secondary considerations, Castillo *et al.* “teaches away” from what is claimed, and applicants have demonstrated “unexpected results”. “[E]vidence rising out of the so-called ‘secondary considerations’ must always when present be considered *en route* to a determination of obviousness.” *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983); MPEP 716.01(a).

Castillo *et al.* teaches away from the use of silicon dioxide by discouraging the use of “glass frit” (a form of silicon dioxide) in the construction of gas sensors. Where the teaching of a reference discourages persons skilled in the art from doing what applicants claim, the reference established “the very antithesis of obviousness.” *In re Buehler* 185 USPQ 781 (CCPA 1975); *In re Rosenberger and Brandt*, 156 USPQ 24, 26 (CCPA 1967); *See also* MPEP(X)(D)(1)-(3). Castillo *et al.* explains that glass frit has been included in catalytic material compositions because it has “good adhesion” characteristic for bonding the catalytic material to a substrate but has “highly negative effects on catalyst performance.” *See* column 6, lines 62-65. In fact, when Castillo *et al.* included frit in its own compositions, it reported that the frit had a “large negative impact on the catalyst activity”. *See* column 2, lines 55-62. Thus, Castillo *et al.* suggests using frit to help bond the catalytic material to a substrate but otherwise teaches away from its use because it negatively impacts the catalytic activity.

In the instant case, a silicon dioxide laminar is formed on the outside surface of the catalytic material. Since Castillo *et al.* discourages the use of frit for anything other than its bonding properties, and indicates that it is detrimental to catalytic activity, one of ordinary skill in the art would be discouraged from using silicon dioxide, especially on the outer surface of a sensor where the sensing interactions occur.

Next, applicants have provided evidence of unexpected results. Presence of a property not possessed by the prior art is evidence of nonobviousness. *In re Papesh*, 315 F.2d 381 (CCPA 1963). The specification provides comparative data showing the beneficial properties imparted to the sensor by coating it with silicon dioxide via an aging process. Fig. 11(A), reproduced below, compares the sensitivity of a sensor that has been treated with an aging process according to the claims (Line A) with a sensor that has not been treated with an aging process (Line B).

FIG. 11



As the graph demonstrates, the sensor treated with the aging process maintains its initial sensitivity with hardly any change over time in comparison to an un-aged sensor. *See also* the specification at p. 18, lines 8-10 and p. 20, lines 5-8.

Additionally, applicants have demonstrated the criticality of having the oxidation catalyst powder in the induction portion being "not less than 30 percent by weight." Figures 2 and 3 compare five compositions that differ in the amount of oxidation catalyst powder as set forth in Table 1, reproduced below.

TABLE 1

Symbol	Insulating Powder Al_2O_3 (wt %)	Oxidation Catalyst Powder		Total Catalyst Quantity (wt %)
		Pd (wt %)	Pt (wt %)	
●	92	7	1	8
■	82	13	5	18
○	67	22	11	33
□	45	45	10	55
△	0	80	20	100

Figure 2 provides data for sensors (according to Table 1) that were treated with an aging process and Figure 3 provides data for sensors (according to Table 1) that were not treated with an aging process. In both circumstances, sensors having the oxidation catalyst powder in the induction portion being not less than 30 percent by weight outperformed the alternatives. Figures 2 and 3 are reproduced below.

FIG. 2

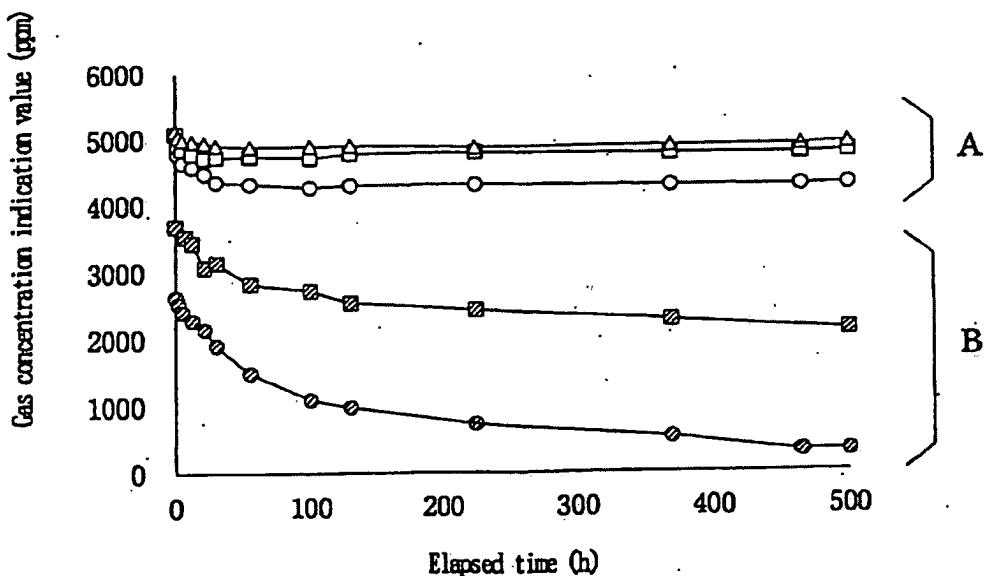
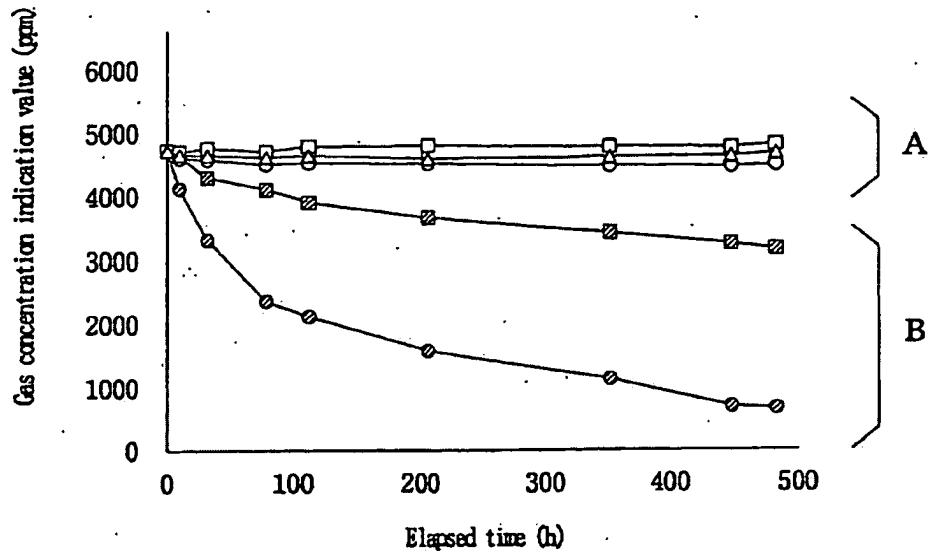


FIG. 3



Thus, even if a *prima facie* case of obviousness were established, which it is not because every element of the claims has not been accounted for, the objective evidence and secondary consideration serve to overcome it. Thus, the rejection is improper and should be withdrawn.

In view of the above, consideration and allowance are respectfully solicited.

In the event the Examiner believes an interview might serve in any way to advance the prosecution of this application, the undersigned is available at the telephone number noted below.

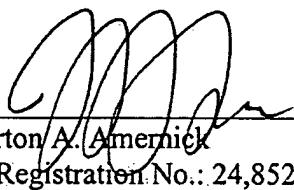
The Office is authorized to charge any necessary fees to Deposit Account No. 22-0185.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 22-0185, under Order No. 21398-00036-US1 from which the undersigned is authorized to draw.

Dated:

Feb. 25, 2008

Respectfully submitted,

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